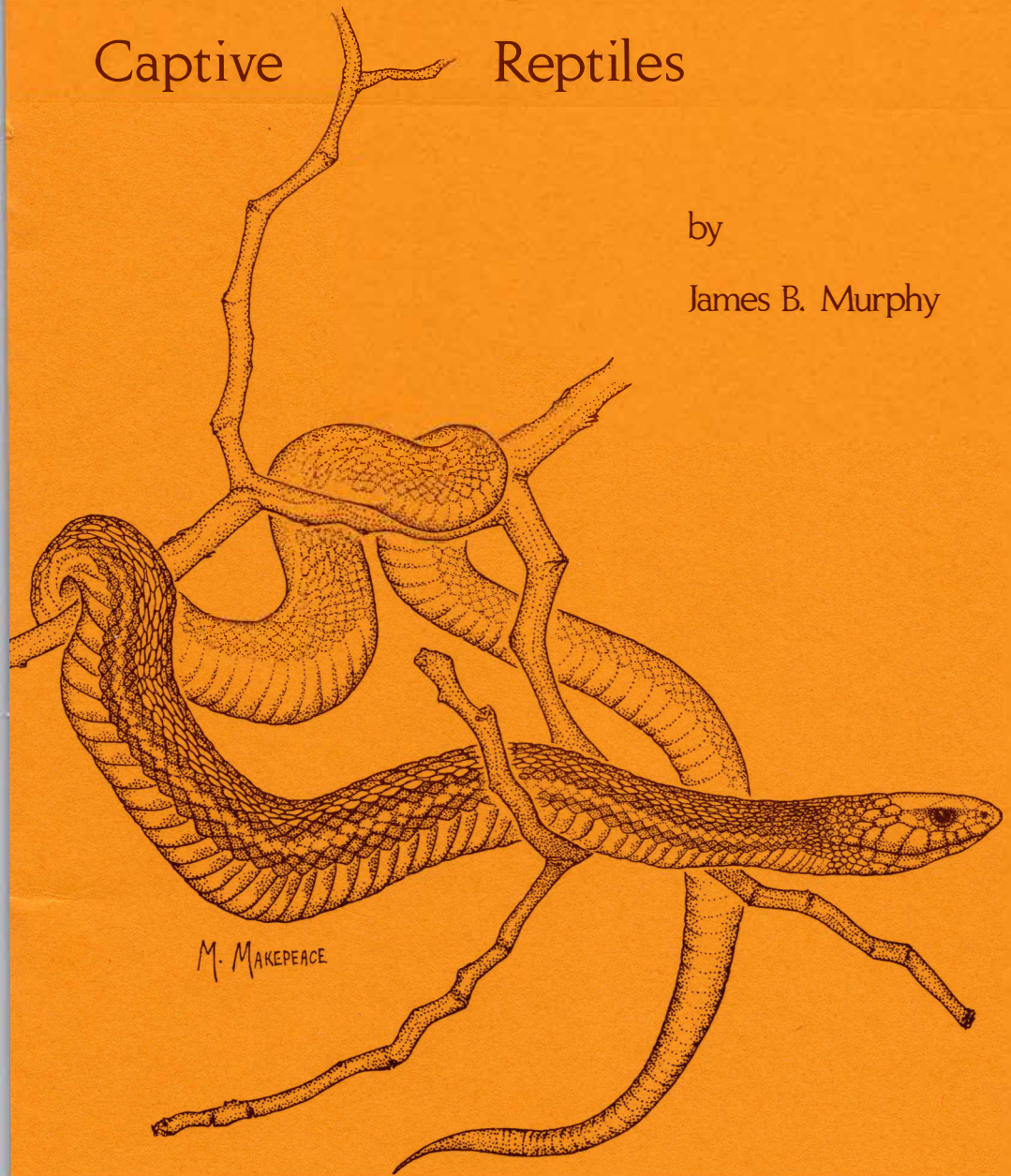


A Brief Outline of Suggested Treatments for Diseases of Captive Reptiles

by

James B. Murphy



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by

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INTRODUCTION

Many diseases which affect captive reptiles are caused by their keepers' unawareness of the temperature, humidity, security, dietary and generalized maintenance requirements needed to sustain reptiles in good health. A complete section on techniques of general maintenance of captive reptiles is beyond the scope of this publication. However, in the belief that such techniques will be of value to readers, a section of general maintenance references has been compiled and included. Readers are also urged to consult the International Zoo Yearbook, Vol. 9, 1969, section 1, dealing with reptiles in captivity. Drugs suggested below are listed in sequence according to efficacy. Refer to Szabuniewicz et al. (1973 in Gen'l. Maint. references) for drug incompatibilities before attempting to combine treatments.

I. Bacterial Infections

If laboratory facilities are available, it is important to identify the causative pathogen (see Glorioso et al. 1974) and perform various antibiotic sensitivity tests on it to determine the best antibiotic treatment.

Abbreviations used--

IV - intravenously injected

IM - intramuscularly injected

IP - intraperitoneally injected

Injection site: turtles, lizards, crocodilians-fermoral area of hind limb; snakes-lateral musculature, midway between vertebral column and ventral scutes at mid-body. Alternate sides for small dosages. Split dosages on either side for larger amounts.

A. Salmonella Organisms

- Signs- greenish feces, wet but formed, fluid clear, uric acid stained with green and yellow. Reptile may gape.
- Treatment- a) Use one of the following: tetracycline products, injected IV, IM in dosage of 6 to 10 mg/kg of body weight - Achromycin (Lederle); Panmycin (Upjohn); Polyotic (Am. Cyanamid); Tetracyn (Pfizer) - for seven daily applications.
- b) intraoral infusion of an aqueous solution of Chloronitrin in dosages of 10-15 mg/kg.

B. Pseudomonas or Aeromonas hydrophila, various pathogens

Necrotic Stomatitis - "mouth rot"

- Signs- necrotic mass of tissue from the gums, intestinal mucosal necrosis in posterior one-third of digestive system.
- Treatment- a) 12 mg/kg of body wt. IM with use of chlortetracycline hydrochloride, such as Aureomycin (Am. Cyanamid). Also, swab affected area with 25% aqueous solution of Sulfamethazine, such as Sulmet (Lederle). Do not remove necrotic tissue. Both, daily for two week period. Multi-B complex vitamins, ascorbic acid as supportive therapy.
- b) See Frye (1973) for use of Betadine Solution (Purdue-Frederick).

C. Respiratory Infections

- Signs- gasping, wheezing or sneezing, salivation or mucoid discharge from mouth and nostrils. Labored breathing.
- Treatment- a) Tylosin, such as Tylocine (Corvel) injected IM following dosage; 125 mg/kg for first day, 50 mg/kg for six more days, or until condition clears.
- b) Chloramphenicol, such as Chloromycetin (Parke-Davis) injected IM 15 mg/kg for the first day, 10 mg/kg for six more days.
- c) Procaine penicillin G (aqueous suspension) 100,000 units/kg of body wt.

D. Pseudomonas aeruginosa

Signs- necrotic enteritis

Treatment- a) Chlortetracycline hydrochloride, such as Aureomycin injected IM, 12 mg/kg.
 b) Polymyxin (repeated daily injections 1-2 mg per injection for a total dose of 10 mg).

NOTE: 0.5 g of Aureomycin in drinking water for five days works well as prophylactic treatment.

E. Various Enteritic Infections

Signs- regurgitations (sometimes caused by reptile drinking water after feeding), bloody feces, mucoid stool.
 It is often difficult to locate the exact causative pathogen and hence the following drugs may be helpful.

Treatment- a) oral administration of 10 mg/kg Biosol (Upjohn) Neomycin sulfate antibiotic on daily basis until condition clears.
 b) Biosol powder used in drinking water. Use dosages of one tsp/gallon.
 c) Daribiotic (Massengill) given orally in dosage of 22 mg/kg body wt. daily for seven days.
 d) Tetracycline product every three days with dosage of 25 mg/kg body wt. for regurgitations.

F. Mycobacterium

Signs- pulmonary tubercles, progressive wasted condition.

Treatment- antibiotic treatment is generally ineffective, although Streptomycin has been recommended.

G. Beneckea chitinovora (Syn-Bacillus chitinovor))

Signs- causes "shell rot" in turtles (see Wallach 1974).
 Lesions on chitinous plates, loosened plates, raw punctate ulcerations eventually covered with yellowish tan pseudo-membrane.

Treatment- eliminate shellfish as food, curette and paint lesions with tincture of iodine.

H. Citrobacter freundii

Signs- attacks turtles, anorexia, lethargy, fatal septicemia, skin ulcerations and necrosis, paralysis of the limbs.

- Treatment- a) Chloromycetin added to water (250 mg/20 gal)
2 or 3 times per week with a few hours of ultraviolet
radiation daily.
b) Also parenteral injections of chloramphenicol
6 mg/100 g of soft tissue weight followed by 3 mg/100
g twice a day for seven days.

I. Leptospira - The clinical significance is unknown.

II. Protozoan Infections

A. Amoebiasis

- Signs- Feces are long and stringy, opaque and whitish,
slimy with an amber colored pool of urea. Formation
of ulcers in intestinal tract, gastric ulcerations.
Liver metastasized along route of portal vein.
- Treatment- a) Emetine hydrochloride USP (Lilly) injected IM
in dosages of 40 mg/kg body wt. daily for seven
days.
b) EnteroVioform (See Zoo Yearbook, Vol. 6, p. 279),
dosage 0.3 g/kg body wt. For symptomatic treatment,
Lomotil (Searle & Co.) dosage 1.25 mg/kg body wt.
orally. Prophylactic treatment consists of 400-800
mg of tetracycline hydrochloride orally per meter
of snake.

B. Trichomoniasis

- Signs- Passing of blood due to a hemorrhaging intestine,
found in regurgitated mucus and feces. Highly active
motile flagellates.
- Treatment- a) Immediately isolate animal, sodium sulfamethazine
at rate of 1 oz/gal of drinking water for ten days.
b) The use of an intraesophageal administration
of an aqueous solution of Emtryl (Salsbury Labs)
at 106 mg/100 g body wt.

C. Coccidiosis

- Signs- viscous bile, damaged gall bladder. Observable from
stool sample.

- Treatment- a) Bayrena (sulfamethoxydiazine) using dosage level of 80 mg/kg for first day, 40 mg/kg for 2-5 days.
 b) Sodium sulfamethazine in drinking water 1 oz/gal for ten days.

D. Ciliates - generally not considered pathogenic.

III. Helminths

(See Benbrook and Sloss 1961 for a general identification of parasites)

A. Strongyles - Flukes

Signs- small worms found in the intestinal tract.

Treatment- For strongyles, (2-2 Dichlorovinyl dimethyl phosphate) Atgard V (Shell Oil Co. Agr. Div. N.Y., N.Y.). 27.5 mg/kg body wt. each day for two days. For flukes and some strongyles, use aqueous solution of Thiabendazole administered by intraesophageal method using dosage of 18 mg/100 g body wt.

B. Nematodes

Treatment- a) Piperazine citrate (various mfgs.) 50 mg/kg body wt. orally for two doses one week apart.
 b) Atgard V as above.

C. Linguatulids

Signs- small "tongue worms" found in oral cavity.

Treatment- a) Tetramisole (Ripercol) dosage 10 mg/kg IP, check for positive parasite load in seven days, repeat if necessary.
 b) Oxytetracycline once daily for 14 days orally.
 See above.

D. Tapeworms

Treatment- a) Diphenethane 70 using dog dosage.
 b) Di-N-butyl-tin oxide at 35 mg/kg body wt. and Niclosamide, such as Yomesan (Chemagro) at 150 mg/kg body wt. both given orally. Check for positive parasite load after 4-6 weeks. Repeat if necessary.

IV. Topical Lacerations - Thermal Burns - Abscesses

A. Topical Lacerations - Thermal Burns

Treatment- Drain and remove necrotic tissue, if present. If necrotic, apply Kymar (Armour-Baldwin). Various medicated creams and powders applied topically to affected area: Furacin Dressing (Eaton), Forte-Topical (Upjohn). It is sometimes necessary to clean wound out with hydrogen peroxide.

B. Abscesses

Signs- Firm swellings caused by parasites, external wounds or hematogenesis spread from a different focus. A number of bacterial organisms have been isolated, i.e. Aeromonas, Citrobacter, Enterobacter, Escherichia, Mycobacterium, Proteus, Salmonella, Serratia.

Treatment- Incise, drain and remove caseous material. Flush with hydrogen peroxide. Use Furacin Dressing (Eaton) or Forte-Topical (Upjohn).

V. Panophthalmitis - Harderian Gland Disease

Signs- Orbital abscessation, eye appears to be obliterated. Swollen eyes in turtles caused by occlusion of Harderian gland ducts.

Treatment- For panophthalmitis, incise beneath the corneal shield, flush with Ringer's Solution with neomycin sulfate added until debris is dislodged. Administer parenteral antibiotics. Harderian gland disease caused by avitaminosis A. Increase amount of vitamin A in diet.

VI. Fungus

Treatment- External fungus can be treated with Weladol Creme (Pitman Moore) and Lugols Solution (most drug stores). Turtles can be soaked in malachite green (1 drop/gal water). Suspend mercury vapor "Sun-lamp." Internal fungus (stool is orange-pink) may be cleared by Furacin Solution (Eaton) using recommended dosage

in drinking water. Certain chameleons develop liver fungus (*Candida*) which can reportedly be cured by Amphotericin B (Squibb), a fungicide for infusion, using manufacturer's suggested dosages.

VII. Mites and Ticks

- Signs- Look for adult mites attached to the skin around orbit, between chin scales, under cloacal plates, etc. Droppings on heavily infested dark animals may give the scales a "salted" appearance. Mites can indirectly cause a fatal septicemia. Ticks are ectoparasites which are attached to the skin.
- Treatment- Mites-Ortho Dibrom 8-E (2-4 cc/gal of water) and Diazinon 25-E (one part of 25% concentrate to 240-480 parts of water). Vapona[®] No-Pest Strip hung according to manufacturer's directions. Ticks are killed with a drop of alcohol applied directly, then carefully removed with tweezers. Treat with topical antibiotic.

VIII. Dehydration

- Treatment- Use electrolyte-amino acid solution such as Ambex (Elanco) at 2.2 cc/kg of body wt. IM daily with multi-vitamin injections until condition improves.

IX. Anesthesia

Consult references for procedures.

1. Hypothermia - place reptile in refrigerator for several hours at 5° C.
2. Thiopental sodium and tricaine methanesulfonate - Karlstrom, E. L. and S. F. Cooke, Jr. 1955. Notes on snake anesthesia. *Copeia* 1955: 57-58.
3. Fluothane - Hagenbrock, C. R. and M. Finster. 1963. Fluothane: a rapid and safe inhalation anesthetic for poisonous snakes. *Copeia* 1963: 440-441.

4. Nembutal or Surital - Betz, T. W. 1962. Surgical anesthesia in reptiles, with special reference to the water snake, Natrix rhombifera. Copeia 1962: 284-287.
 5. M-99 (Etorphine) - Wallach, J. D. 1966. Medical care of reptiles. J Am. Vet. Med. Assoc. 155: 1017-1034.
 6. Tribromoethanol - Hunt, T. J. 1964. Anaesthesia of the tortoise. In Small animal anesthesia. The Macilllan Co. New York.
- X. Miscellaneous Husbandry Techniques
- A. Vitamins - Calcium - trace elements
 1. Vitamin A-D-E (Philip Roxane, Inc.) dosage is injected at 1 cc/2.2 kg body wt.
 2. ABDEC - liquid drops (2 drops/pint) in drinking water. Also can be injected into dead food item.
 3. Pervinal (U.S. Vitamin and Pharmaceutical Corp.) powder sprinkled in/on food.
 4. Calcium - Phosphorous ratio (see Murphy, 1973).
 - B. Disinfectants
 1. HTH (calcium hypochlorite) - used for disinfecting tools.
 2. Roccal, Roccal D. quaternary ammonium - used for cleaning cages, general disinfectant. Never use phenol compounds, coal tar derivatives, rotenone.
 - C. Impactions of the bowels or oviduct - make lateral incision next to the obstruction. Remove material. Suture with #00 catgut and overlying skin with cotton. See Frye (1973, p. 25).
 - D. Prolapse of the cloaca - clean with physiologic saline, treat with decongestant and replace manually. Sprinkle sugar on area to encourage withdrawal.
 - E. For techniques involving amputations and other surgical procedures, see Frye (1973) and Wallach (1969).
 - F. Ball Pythons occasionally develop a skin condition (etiology unknown) characterized by a cracked, peeling appearance. Spray affected area daily with Dermoplast (Ayerst).
 - G. Paralysis of hind limbs in iguanid lizards - Suspend mercury vapor "Sun-lamp" (275 watt/110 volt) at least five feet above

lizard. Treat for eight hours daily and supplement diet with vitamin-mineral additive. Condition should clear in 2-3 months.

- H. Abnormal shell growth - soft shell in turtles - improper vitamin D, calcium-phosphorous and ultraviolet ratio. See Murphy (1973).

XI. Amended list of treatments and medications taken from The principal diseases of the lower vertebrates, Reichenbach-Klinke and Elkan, 1965.

<u>Diagnosis</u>	<u>Drug</u>	<u>Application</u>
Eye Infections	Borax solution	External as drops
Inflammation of mouth	Chinosol	Solution as bath
<u>Aeromonas hydrophila</u>	Chloramphenicol	Oral or added to water
Parasites	Cod liver oil	External
Rickets	Same (as ointment)	Internal
Disinfection of cages	Cuprex	Solution
	Formalin	5-10% solution
Amoebiasis	EnteroVioform	Mixed with food
Skin injuries	Iodine	External, with brush
Skin defects and inflammation	Proflavin emulsion	External
	Lugol's solution	External, with brush
Helminthiasis	Nematolyt-Vet	With food
Ophthalmic inflammations	Protargol	5% sol. as eye drops or bath
White spots on turtles	Salt (NaCl)	Mild solutions, as bath
Diarrhoea	Socatyl (Ciba)	Solution in water
Avitaminosis	Vitamin drugs f.i.	Mix with food
	Vigartol	

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